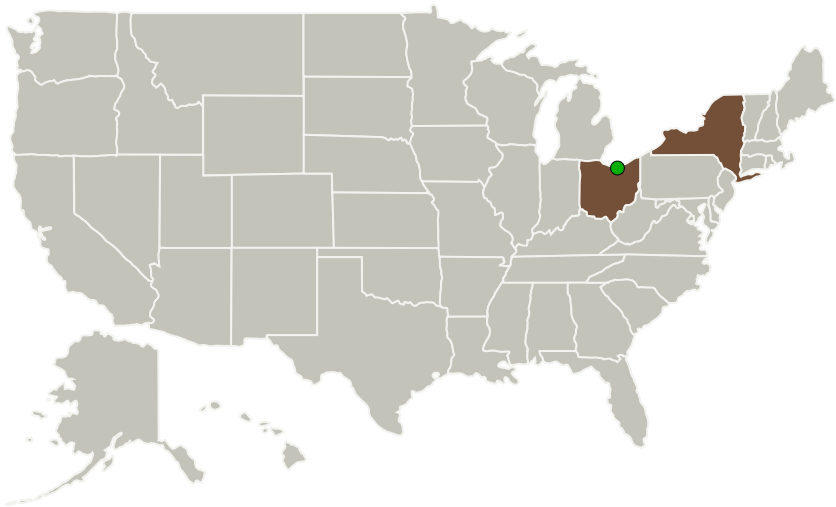
High Energy Battery Materials with Novel Separator and Electrolytes for Space Applications, Phase I

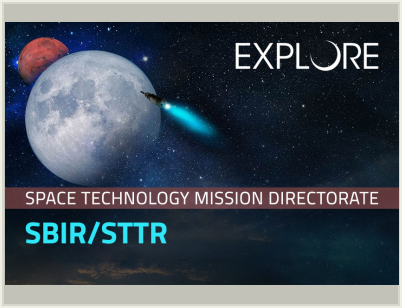
Completed Technology Project (2012 - 2012)

Project Introduction

Future space exploration energy-storage needs span a wide range of requirements. NASA's Exploration missions will require safe, human-rated, high specific energy, high energy density and high efficiency-storage systems that can be used in space and on the moon and Mars. These energy storage devices need to be used in applications such as Landers, Rovers, and extravehicular activities (EVAs). NOHMs Technologies, Inc. proposes to develop a novel battery based on Lithium-Sulfur chemistry that has a demonstrated specific energy of 1875 Wh/kg with a theoretical specific energy of 2600 Wh/kg, while yielding a dramatic 3-4x reduction in weight, size, and cost. The proposed technology is based on innovative sulfur-infused carbon composite cathode materials developed at Cornell University. These materials overcome the poor cycle life problems that have plagued Lithium-Sulfur batteries by encapsulating sulfur in nanometer-sized mesoporous carbon capsules. In addition, the proposed Phase I research will focus on the development of stable, non-flammable, non-volatile, nano-hybrid electrolytes and separators that overcomes lithium dendrite formation in all lithium based battery configurations, significantly enhancing their safety. Phase I will demonstrate the potential of our proposed system to meet the performance parameters specified by NASA.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Nohms Technologies	Lead Organization	Industry	Rochester, New York
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
New York	Ohio

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138196)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Nohms Technologies

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

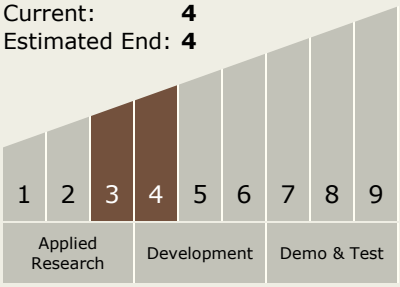
Carlos Torrez

Principal Investigator:

Navaneedharakrishnan Jayaprakash

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.1 Electrochemical: Batteries

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System